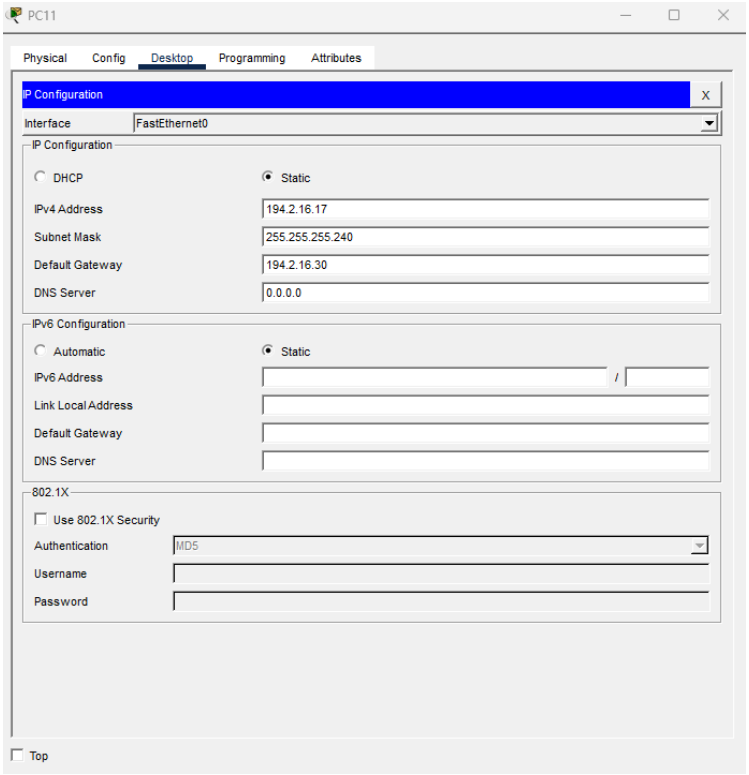
TP8 : Routage et sous-réseaux

Sommaires

1. Visualisation des tables de routage :

vérification de la configuration IP des interfaces PC11 routeur 11 :

PC11



R11

```
R11>show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        194.2.16.33     YES manual up                    up
FastEthernet0/1        194.2.16.30     YES manual up                    up
Vlan1                  unassigned      YES unset  administratively down down
R11>
```

Vérification de la table de routage des routeurs R1 et R11 a l'aide de la commande show ip route :

R1

```
R1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/2174976] via 194.2.16.97, 00:07:18, Serial0/0/0
D       194.2.16.32 [90/2172416] via 194.2.16.97, 00:07:43, Serial0/0/0
D       194.2.16.48 [90/2174976] via 194.2.16.97, 00:07:18, Serial0/0/0
C       194.2.16.96 is directly connected, Serial0/0/0
D       194.2.16.112 [90/2172416] via 194.2.16.146, 00:07:45, Serial0/0/1
                     [90/2172416] via 194.2.16.97, 00:07:43, Serial0/0/0
D       194.2.16.128 [90/2681856] via 194.2.16.146, 00:07:44, Serial0/0/1
                     [90/2681856] via 194.2.16.97, 00:07:43, Serial0/0/0
C       194.2.16.144 is directly connected, Serial0/0/1
D       194.2.16.192 [90/2174976] via 194.2.16.146, 00:07:19, Serial0/0/1
D       194.2.16.208 [90/2172416] via 194.2.16.146, 00:07:45, Serial0/0/1
D       194.2.16.224 [90/2174976] via 194.2.16.146, 00:07:19, Serial0/0/1
```

R11

```
R11>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

S    192.168.2.0/24 [1/0] via 194.2.16.35
     194.2.16.0/28 is subnetted, 10 subnets
C       194.2.16.16 is directly connected, FastEthernet0/1
C       194.2.16.32 is directly connected, FastEthernet0/0
D       194.2.16.48 [90/30720] via 194.2.16.34, 00:08:59, FastEthernet0/0
D       194.2.16.96 [90/2172416] via 194.2.16.35, 00:08:59, FastEthernet0/0
D       194.2.16.112 [90/30720] via 194.2.16.35, 00:08:59, FastEthernet0/0
D       194.2.16.128 [90/2172416] via 194.2.16.35, 00:08:59, FastEthernet0/0
D       194.2.16.144 [90/2174976] via 194.2.16.35, 00:08:59, FastEthernet0/0
D       194.2.16.192 [90/35840] via 194.2.16.35, 00:08:58, FastEthernet0/0
D       194.2.16.208 [90/33280] via 194.2.16.35, 00:08:59, FastEthernet0/0
D       194.2.16.224 [90/35840] via 194.2.16.35, 00:08:58, FastEthernet0/0
```

Vérification de la connectivité des 4 PC :

PC11 et PC12

```
C:\>ping 194.2.16.49

Pinging 194.2.16.49 with 32 bytes of data:

Reply from 194.2.16.49: bytes=32 time<1ms TTL=126
Reply from 194.2.16.49: bytes=32 time<1ms TTL=126
Reply from 194.2.16.49: bytes=32 time<1ms TTL=126
Reply from 194.2.16.49: bytes=32 time<1ms TTL=126

Ping statistics for 194.2.16.49:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC11 et PC21

```
C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Reply from 194.2.16.193: bytes=32 time<1ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC11 et PC22

```
C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Request timed out.
Reply from 194.2.16.225: bytes=32 time=1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

PC12 et PC21

```
C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Reply from 194.2.16.193: bytes=32 time=1ms TTL=124
Reply from 194.2.16.193: bytes=32 time=5ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124
Reply from 194.2.16.193: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 5ms, Average = 1ms
```

PC12 et PC22

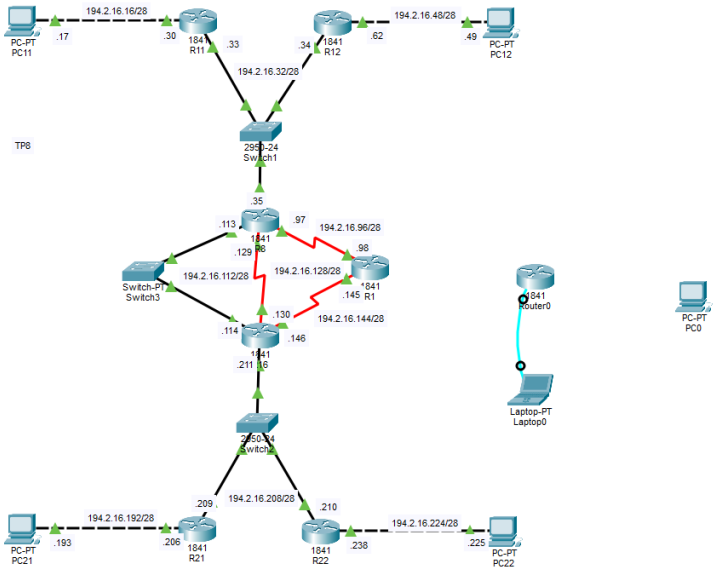
```
C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124
Reply from 194.2.16.225: bytes=32 time<1ms TTL=124

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

PC21 et PC22

```
C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Reply from 194.2.16.225: bytes=32 time<1ms TTL=126
Reply from 194.2.16.225: bytes=32 time<1ms TTL=126
Reply from 194.2.16.225: bytes=32 time<1ms TTL=126
Reply from 194.2.16.225: bytes=32 time=6ms TTL=126

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 6ms, Average = 1ms
```

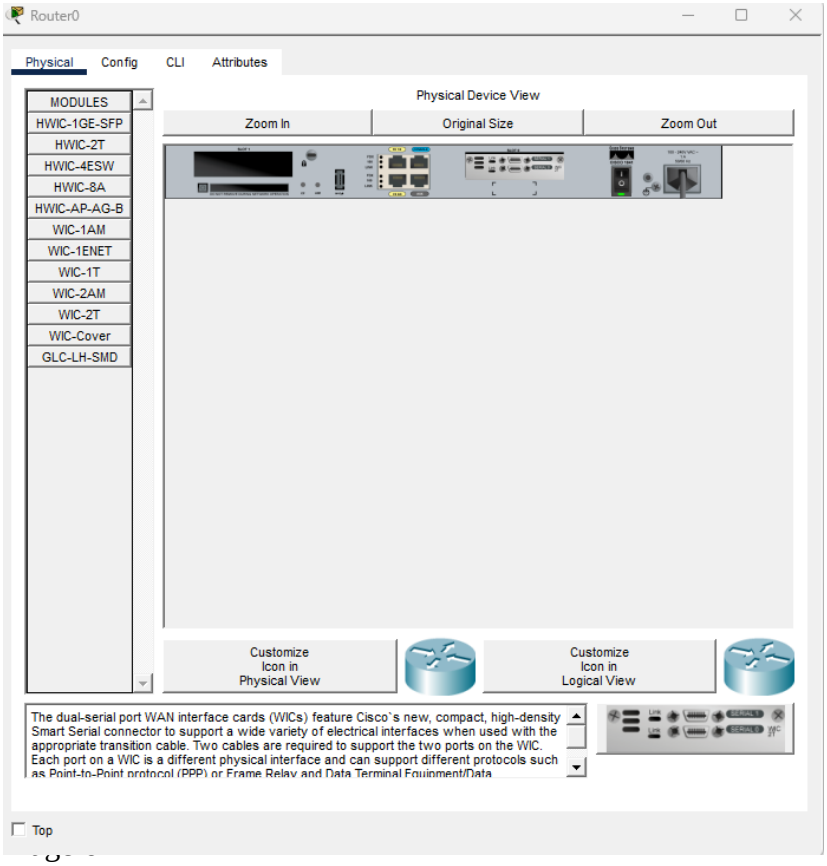
2. Ajout du routeur R0 et de l’ordinateur PC0 :

2.1. Placement des périphériques dans la topologie :



2.2. Ajout du module WIC-2T au routeur :

ajout du module WIC-2T vers l’emplacement a droite du routeur



2.3. Configuration de base du routeur : utilisation du mode « setup » :

configuration du routeur via l'émulateur de Terminal

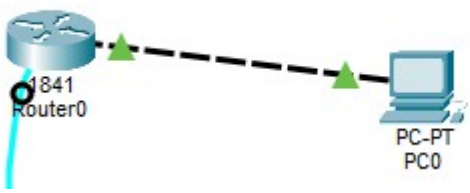
```
!
interface FastEthernet0/1
 shutdown
 no ip address
!
interface Serial0/0/0
 shutdown
 no ip address
!
interface Serial0/0/1
 shutdown
 no ip address
!
end

[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]: 2
Building configuration...
[OK]
Use the enabled mode 'configure' command to modify this configuration.


Press RETURN to get started!


%LINK-3-UPDOWN: Interface Vlan1, changed state to down

%LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to down

%LINK-3-UPDOWN: Interface FastEthernet0/1, changed state to down

%LINK-5-CHANGED: Interface Vlan1, changed state to administratively down

%LINK-5-CHANGED: Interface FastEthernet0/1, changed state to administratively dow

%SYS-5-CONFIG_I: Configured from console by console


R0>
```

Passage de la commande setup en mode privilégié :

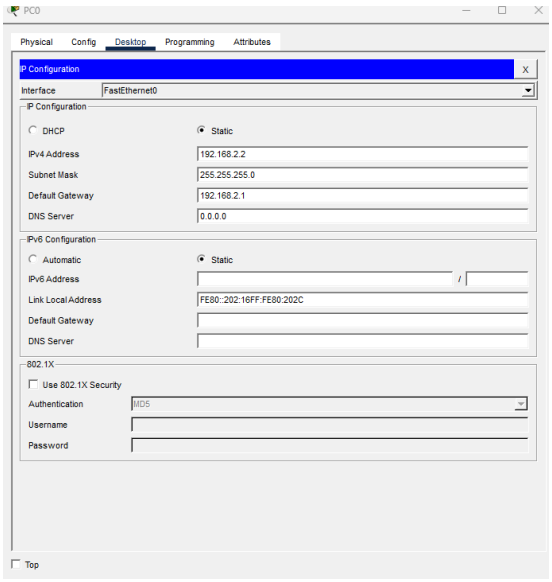
```
R0>en
Password:
R0#
```

2.4. Configuration de l'ordinateur et connexion au routeur :

Connexion de l'ordinateur au routeur a l'aide d'un câble croisé



Renseignement de la configuration IP de l’ordinateur



2.5. Observez le fonctionnement ARP et vérifiez la connectivité entre PC0 et R0 :

Commande arp -a dans l’invite de commande du PC0

```
Cisco Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>
```

Utilisation de la commande show arp dans l’émulateur Terminal du portable

```
R0>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.2.1            -   0009.7CD3.3801  ARPA   FastEthernet0/0
```

Utilisation de la commande ping 192.168.2.1 pour vérifier la connectivité entre les deux périphériques

```
C:\>ping 192.168.2.1

Pinging 192.168.2.1 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time=3ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.2.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 3ms, Average = 0ms
```

Utilisation de la commande arp -a

```
C:\>arp -a
  Internet Address      Physical Address      Type
  192.168.2.1           0009.7cd3.3801        dynamic
```

Utilisation de la commande show arp sur le routeur 0

```
R0>show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  192.168.2.1            -   0009.7CD3.3801  ARPA   FastEthernet0/0
Internet  192.168.2.2            3   0002.1680.202C  ARPA   FastEthernet0/0
```

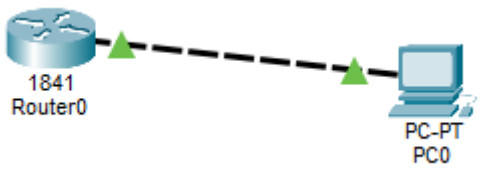
Chacun des deux périphériques a maintenant une entrée vers l'autre dans sa table arp

2.6. Test de la connexion Telnet au routeur :

Teste de la connexion Telnet au routeur 0 a partir de l'invite de commande du PC0

```
C:\>telnet 192.168.2.1
Trying 192.168.2.1 ...Open


User Access Verification

Password:
R0>
```

Comme les résultats des paragraphes 2.5 et 2.6 on peut maintenant supprimer le câbles console et le portable



2.7. Connexion du routeur R0 au routeur R1 :

Connexion de l'interface Serial0/0/0 du routeur R0 a l'interface e Serial0/1/0 du routeur R1 a l'aide du câble série DCE

2.8. Configuration de l'interface série du routeur R0 :

Configuration IP de l'interface Serial0/0/0 :

```
R0>en
Password:
Password:
R0#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R0(config)#interface s0/0/0
R0(config-if)#ip address 192.168.1.2 255.255.255.0
R0(config-if)#
```

Configuration de la synchronisation avec la commande clock rate 64000 :

```
R0(config-if)#clock rate 64000
```

Activation de l'interface :

```
R0(config-if)#no shutdown

R0(config-if)#
%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
```

Utilisation des touches Ctrl+Z pour quitter le mode configuration et utlisation de la commande copy run start pour enregistrez la configuration :

```
R0(config-if)#^Z
R0#
%SYS-5-CONFIG_I: Configured from console by console

R0#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
R0#
```

Vérification de la configuration IP du Routeur 0 a l'aide de la commande show ip interface brief :

```
R0#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
FastEthernet0/0        192.168.2.1     YES manual up                    up
FastEthernet0/1        unassigned      YES unset  administratively down down
Serial0/0/0            192.168.1.2     YES manual up                    up
Serial0/0/1            unassigned      YES unset  administratively down down
Vlan1                  unassigned      YES unset  administratively down down
```

ping de l'interface S0/1/0 du Routeur 1 a partir de PC0

```
C:\>ping 192.168.1.0

Pinging 192.168.1.0 with 32 bytes of data:

Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255
Reply from 192.168.2.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.0:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

3. Ajout de routes :

Consultation de la table de routage du Routeur 0 :

```
R0>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Serial0/0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
```

Consultation de la table de routage du Routeur 1 :

```
R1>show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Serial0/1/0
S    192.168.2.0/24 [1/0] via 192.168.1.2
     194.2.16.0/28 is subnetted, 10 subnets
D       194.2.16.16 [90/2174976] via 194.2.16.97, 00:29:45, Serial0/0/0
D       194.2.16.32 [90/2172416] via 194.2.16.97, 00:30:08, Serial0/0/0
D       194.2.16.48 [90/2174976] via 194.2.16.97, 00:29:45, Serial0/0/0
C       194.2.16.96 is directly connected, Serial0/0/0
D       194.2.16.112 [90/2172416] via 194.2.16.146, 00:30:10, Serial0/0/1
                     [90/2172416] via 194.2.16.97, 00:30:08, Serial0/0/0
D       194.2.16.128 [90/2681856] via 194.2.16.146, 00:30:09, Serial0/0/1
                     [90/2681856] via 194.2.16.97, 00:30:08, Serial0/0/0
C       194.2.16.144 is directly connected, Serial0/0/1
D       194.2.16.192 [90/2174976] via 194.2.16.146, 00:29:44, Serial0/0/1
D       194.2.16.208 [90/2172416] via 194.2.16.146, 00:30:10, Serial0/0/1
D       194.2.16.224 [90/2174976] via 194.2.16.146, 00:29:44, Serial0/0/1
```

Il y a trois possibilités elle sont :

- Ajouter toute les routes une par une ;
- Faire une route agrégée ;
- Faire une route par défaut

La meilleur possibilité serait de faire une route par défaut pour le routeur 0 :

```
R0(config)#ip route 0.0.0.0 0.0.0.0 192.168.1.0
```

Teste de la connectivité entre PC0 et les autres PC.

```
C:\>ping 194.2.16.17

Pinging 194.2.16.17 with 32 bytes of data:

Reply from 194.2.16.17: bytes=32 time=13ms TTL=124
Reply from 194.2.16.17: bytes=32 time=14ms TTL=124
Reply from 194.2.16.17: bytes=32 time=14ms TTL=124
Reply from 194.2.16.17: bytes=32 time=14ms TTL=124

Ping statistics for 194.2.16.17:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 13ms, Maximum = 14ms, Average = 13ms

C:\>ping 194.2.16.49

Pinging 194.2.16.49 with 32 bytes of data:

Reply from 194.2.16.49: bytes=32 time=16ms TTL=124
Reply from 194.2.16.49: bytes=32 time=11ms TTL=124
Reply from 194.2.16.49: bytes=32 time=14ms TTL=124
Reply from 194.2.16.49: bytes=32 time=11ms TTL=124

Ping statistics for 194.2.16.49:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 16ms, Average = 13ms

C:\>ping 194.2.16.225

Pinging 194.2.16.225 with 32 bytes of data:

Reply from 194.2.16.225: bytes=32 time=19ms TTL=124
Reply from 194.2.16.225: bytes=32 time=11ms TTL=124
Reply from 194.2.16.225: bytes=32 time=13ms TTL=124
Reply from 194.2.16.225: bytes=32 time=13ms TTL=124

Ping statistics for 194.2.16.225:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 11ms, Maximum = 19ms, Average = 14ms

C:\>ping 194.2.16.193

Pinging 194.2.16.193 with 32 bytes of data:

Reply from 194.2.16.193: bytes=32 time=18ms TTL=124
Reply from 194.2.16.193: bytes=32 time=10ms TTL=124
Reply from 194.2.16.193: bytes=32 time=21ms TTL=124
Reply from 194.2.16.193: bytes=32 time=9ms TTL=124

Ping statistics for 194.2.16.193:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 9ms, Maximum = 21ms, Average = 14ms
```

Capture d’écran de la table de routage de R0 et enregistrement de la configuration avec la commande copy run start

```
R0#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 192.168.1.0 to network 0.0.0.0

C    192.168.1.0/24 is directly connected, Serial0/0/0
C    192.168.2.0/24 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 192.168.1.0

R0#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
```